ORIGINAL ARTICLE

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Evaluation of the number of SPECT projections in the ordered subsets-expectation maximization image reconstruction method

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Filtered back projection (FBP) method, maximum likelihood-expectation maximization (ML-EM) method, and ordered subsets-expectation maximization (OS-EM) method are currently used for reconstruction of SPECT images in clinical studies. In the ML-EM method, images of good quality can be reconstructed even with a small sampling number of projection data, when compared with FBP. Shorter acquisition time and less radionuclide dose are preferable in the clinical setting if image quality is the same. In this study, we attempted to find optimal conditions for reconstruction of OS-EM images with commonly used sampling numbers of 30, 60 and 120 (step angles: 12°, 6°, and 3°, respectively), with acquisition counts/projection of 30, 60, 120 and 240 each. We adjusted the pixel counts of reconstructed images to be constant, by setting combination of sampling number and counts/projection (120 sampling number for 30 counts/projection, 60 for 60, and 30 for 120). Among the 3 acquisition conditions, the small sampling number of 30 had large acquisition counts per direction, resulting in low signal to noise ratio. Under this condition, the resolution was slightly low, but the uniformity of images was high. The combination of OS-EM and smaller sampling projection number may be clinically useful with reduction of the examination time, which is also beneficial to reduce dead time for gamma-camera rotation.

Key words: transmission computed tomography, ordered subsets-expectation maximization, the number of SPECT projections